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**Notes:**

1. Untranslatable words are replaced with asterisks (\*\*\*).
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## **FULL CONTENTS**

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**[Claim(s)]**

[Claim 1]A surface activity assistant containing cane sugar fatty acid diester for manufacturing microemulsion using polyglyceryl fatty acid ester.

[Claim 2]A surfactant mixture for microemulsion manufacture containing a surface activity assistant which consists of polyglyceryl fatty acid ester and cane sugar fatty acid diester.

[Claim 3]Microemulsion containing polyglyceryl fatty acid ester and cane sugar fatty acid diester.

[Claim 4]Cosmetics which consist of the microemulsion according to claim 3.

[Claim 5]Drugs which consist of the microemulsion according to claim 3.

[Claim 6]Foodstuffs which consist of the microemulsion according to claim 3.

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**[Detailed Description of the Invention]**

[0001]

[Field of the Invention]This invention relates to the surface activity assistant used when manufacturing microemulsion using polyglyceryl fatty acid ester. The microemulsion manufactured by this invention is used for broad fields, such as cosmetics, drugs, and foodstuffs.

[0002]

[Description of the Prior Art]Microemulsion is a transparent homogeneous solution containing two fluids (for example, water and an oil) which originally are not mixed.

Generally it is obtained by loose mixing of a component.

Microemulsion differs from the macro emulsion which needs churning intense for that generation remarkably at this point. The structure of microemulsion changes from an o/w type to a w/o type through bicontinuous structure as the spontaneous curvature of a surface active agent changes from positive to negative. In the microemulsion formed by water / polyoxyethylene type nonionic surfactant / oil 3 component system, such a structural change is observed by a temperature change. The solubilization capacity of the surface active agent in this system becomes the maximum at the temperature with which the hydrophilic-lipophilic balance (HLB) of a system balances, i.e., HLB temperature. At HLB temperature, it has bicontinuous structure and ultralow interfacial tension is attained, almost equal weight of water and oils can be mixed mutually, and microemulsion can be equalized.

[0003]What has a salting out effect to hydrophilic chains, such as mineral salt and a polyol, in order to make the solubilization capacity in water / surface active agent / an oil system increase. Or using surface activity assistants (cosurfactant), such as inside chain length's alcohol, a polyoxyethylene type surface active agent, mono- acylation glycerol with a comparatively short hydrophilic group, is known. When a surface activity assistant is used as an additive for making solubilization capacity increase, generally an oleophilic surface activity assistant is added to the ionicity or the nonionic surface active agent of hydrophilicity. In this case, HLB of a system changes a lot and, as a result, HLB temperature (temperature which microemulsion generates) also changes with the mixing ratio of a surface active agent and a surface activity assistant a lot. For this reason, there was a problem of microemulsion not generating at the temperature assumed that microemulsion is generated. Since such a surface activity assistant has the very high monodisperse solubility over an oil, the efficiency to which solubilization capacity is made to increase becomes that much low.

[0004]

[Problem to be solved by the invention]Thus, since a publicly known surface activity assistant melted into the fault of changing the hydrophilic-canal balance (HLB) of a system a lot, and an oil, easily, there was a fault that the efficiency to which solubilization capacity is made to increase needed to use in large quantities low therefore. So, HLB of the system was not changed and development of the additive which solubilization capacity is increased and is sold at a little addition was needed.

[0005]

[Means for solving problem]As a result of inquiring wholeheartedly that the above-mentioned problem should be solved, when manufacturing microemulsion using the polyglyceryl fatty acid ester of a nonionic surface active agent, [ this invention person ] Without changing HLB of a system a lot, when cane sugar fatty acid diester is used as a surface activity assistant, since the monodisperse concentration to the oily component was dramatically low because of the strong hydrophilicity of a cane sugar group, it found out that solubilization capacity can be made to increase efficiently, and this invention was reached. Sucrose fatty acid ester also has the advantage that the load to environment is small, from excelling in biodegradability as compared with the conventional surface activity assistant.

[0006]That is, the gist of this invention consists in the surface activity assistant containing cane sugar fatty acid diester for manufacturing microemulsion using polyglyceryl fatty acid ester. It consists in the microemulsion containing polyglyceryl fatty acid ester and cane sugar fatty acid diester and the cosmetics which consist of this microemulsion, drugs, and foodstuffs.

[0007]

[Mode for carrying out the invention]It explains to details per this invention below. The microemulsion in this invention is water and a homogeneous solution containing an oily component, there are an o/w type, a bicontinuous type, and a w/o type, and the diameter of micelle particles in the case of being an o/w type or a w/o type says what is 10 micrometers from 100 nm. In this invention, in order to manufacture microemulsion, the surface activity assistant which contains cane sugar fatty acid diester with polyglyceryl fatty acid ester is used.

[0008]the constituent-fatty-acids kind in the cane sugar fatty acid diester contained in the surface activity assistant of this invention -- the carbon numbers 8-24 -- they are 10-20, and a thing that has a straight chain the saturation of 12-18, or unsaturated or branching more preferably preferably. As these fatty acid, lauric acid, myristic acid, and palmitic acid, Stearic acid, arachin acid, behenic acid, tetradecenoic acid, hexadecenoic acid, Octadecenoic acid, octadecadienoic acid, eicosenic acid,

eicosatetraenoic acid, dococenoic acid, an octadecatrienoic acid, isostearic acid, etc. are mentioned, stearic acid and palmitic acid are preferred, and also stearic acid is especially preferred. These fatty acid can also be used in two or more kinds of combination according to the purpose.

[0009]The sucrose fatty acid ester in which the degrees of esterification of a mono- \*\* bird, tetra, etc. other than cane sugar fatty acid diester differ may be included in the surface activity assistant of the invention in this application. Usually, as for the rate of the cane sugar fatty acid diester in the sucrose-fatty-acid-ester entire volume in that case, although sucrose fatty acid ester is used as a mixture of each ester, such as mono- \*\* J1 and a bird, in many cases, 30 weight % or more is preferred. If the content of diester is lower than this range, the solubilization capacity increase effect falls and it is not desirable.

[0010]The cane sugar fatty acid diester in this invention can obtain what has high purity with column chromatography, for example, after compounding sucrose fatty acid ester with a known synthetic process (a surface active agent analytical method, P.122, Saiwai Shobo).

[0011]The polyglyceryl fatty acid ester used by this invention is usually obtained by making polyglycerin and fatty acid react. Generally the average degrees of polymerization with polyglycerin are 2-16, and are 4-12 preferably. although generally chosen out of the saturation or the unsaturated fatty acid of the carbon numbers 8-24 as constituent fatty acids -- desirable -- 10-20 -- it is 12-18 more preferably. As these fatty acid, lauric acid, myristic acid, and palmitic acid, Stearic acid, arachin acid, behenic acid, tetradecenoic acid, hexadecenoic acid, Octadecenoic acid, octadecadienoic acid, eicosenic acid, eicosatetraenoic acid, dococenoic acid, an octadecatrienoic acid, isostearic acid, etc. are mentioned, and lauric acid, myristic acid, palmitic acid, etc. are preferred especially. These fatty acid can also be used in two or more kinds of combination according to the purpose. Polyglyceryl fatty acid ester is excellent in safety as compared with other nonionic surface active agents, such as polyoxyethylene alkyl ether, and suitable for the use to cosmetics and an eating-and-drinking article.

[0012]The microemulsion of this invention is obtained by mixing polyglyceryl fatty acid ester, cane sugar fatty acid diester, water, and an oily component. Even if it mixes each component at once, it can manufacture, but the surfactant mixture which contains beforehand the surface activity assistant which consists of polyglyceryl fatty acid ester and cane sugar fatty acid diester can be manufactured, and this can also be added and manufactured into water and the mixture of an oily component. The method of distilling off a solvent, after the surfactant mixture in this case dissolves the mixture of the surface activity assistant containing polyglyceryl fatty acid ester and cane sugar fatty acid diester in an organic solvent from a viewpoint of raising homogeneity, It is preferred to manufacture these two ingredients by the method of mixing at the temperature more than a melting point.

[0013]As an oily component used by this invention, liquefied high-class aliphatic hydrocarbon, "plant and animal oil fat, a higher alcohol, a higher fatty acid, synthetic ester oil, glycol higher fatty acid ester, silicone oil, etc. are used. For example, n-heptane, n-octane, n-Decan, n-hexadecane, Liquid paraffin, squalane, oleum rapae, olive oil, castor oil, jojoba oil, octyldodecanol, octyldodecyl myristate, 2-ethyl-hexanoic-acid triglyceride, triglyceride caprate, an olein alcohol, oleic acid, etc. can be mentioned. these oily components -- one sort -- or two or more sorts can be combined and it can also use.

[0014]Polyglyceryl fatty acid ester. [ and the surface activity assistant which consists of cane sugar fatty acid diester ] the polyglyceryl fatty acid ester and cane sugar fatty acid diester in the surfactant mixture for the microemulsion manufacture to include -- a weight ratio -- 99 / 1 - 50/50 -- desirable -- 95 / 5 - 60/40 -- it mixes so that it may be more preferably set to 90 / 10 - 70/30. if the content of cane sugar fatty acid diester is below this range, the solubilization capacity increase effect will fall -- in case

of more than this range, the mixture of cane sugar fatty acid diester polyglyceryl fatty acid ester forms liquid crystal, and it becomes difficult [ microemulsion ] again to generate it.

[0015][ the surfactant mixture in the microemulsion of this invention, an oily component, and the content weight fraction of water ] Generally, it may be 1 to 50%, 0.1 to 98.9%, and 0.1 to 98.9%, and the molds of microemulsion may be o/w type, w/o type, and bicontinuous type any, respectively. Generally the content of cane sugar fatty acid diester is 0.01 to 25 weight % to the microemulsion whole quantity of this invention, and, generally the content of the polyglyceryl fatty acid ester to the microemulsion whole quantity of this invention is 0.5 to 49.5 weight %.

[0016]Micro mull SHON by this invention, [ as cosmetics ] A cleaning agent, a shampoo, rinse, a tonic, hair oil, a hair lotion, It can be used for an aftershave lotion, a body lotion, emollient oil, a makeup lotion, cleansing cream oil, an aerosol product, a deodorizer, an aromatic, a deodorant, bath salts, etc. As a medicine use, it can be used for oral administration preparation, the skin or the agent for membrane inapplicable, injection pharmaceutical preparation, or a drug delivery system. furthermore -- as a foodstuffs use -- ice cream, a coffee whitener, whipped cream, cheese, mayonnaise, a dressing, whipped cream, and a source -- it hangs down and can be used for a coffee drink, an alcoholic beverage, a milk beverage, solubilization oiliness perfume, etc. When using for these uses, [ the amount of surfactant mixtures containing polyglyceryl fatty acid ester and cane sugar fatty acid diester ] Generally the quantity of the cane sugar fatty acid diester which it is generally contained one to 30weight % to cosmetics, a drink, and drugs, and is occupied in the surfactant mixture is 1 to 50 weight %.

[0017]

[Working example]Although an embodiment explains the following and this invention further, this invention is not limited to the following embodiments, unless the gist is exceeded.

[The example 1 of manufacture] [ the refining chloroform / methanol (8/2) mixed solvent by cane sugar stearic acid diester column chromatography ] [ what dissolved the cane sugar stearic acid ester S-595 (made by Mitsubishi Chemical) ] When it added to the swollen silica gel with which the column chromato-tube was filled up, and was eluted using chloroform / methanol mixed solvent (8/2) and the diester fraction and the monoester fraction were condensed, respectively, the cane sugar stearic acid diester of 100% of purity was obtained.

[0018][The example 2 of manufacture] By using an advanced simulated moving bed chromatography separation device from the hexaglycerine (polyglycerin #500; the Sakamoto medicine company make, average degree of polymerization 5.9) of example marketing of manufacture of polyglycerin laurate, the degree of polymerization prepared the polyglycerin which removed seven or more components. The average degree of polymerization calculated from the hydroxyl value of this polyglycerin was 4.5. Make fatty acid/rate of a polyglycerin reaction preparation molar ratio into 1/1, and 156.4 g (0.446 mol) of this polyglycerin is received, Lauric acid (NAA-122; the Nippon Oil & Fats Co., Ltd. make, 99 weight % or more of lauric acid) and 10% aqueous sodium hydroxide are prepared so that the amount of sodium hydroxide may be 0.0025wt% (opposite whole quantity), After making it react at the bottom ordinary pressure of a nitrogen air current, and 240 \*\* for 2.5 hours, carried out the rise in temperature to 260 \*\*, it was made to react for 4 hours, and polyglycerin laurate was obtained. By liquid-liquid extraction, unreacted polyglycerin was removed and polyglycerin laurate not more than residual polyglycerin 1% was obtained from this polyglycerin laurate.

[0019][Examples 1-3 of an actual situation] The polyglycerin laurate obtained in the example 2 of manufacture, the cane sugar stearic acid diester obtained in the example 1 of manufacture, heptane, and

distilled desalted water were mixed with each compounding ratio, and heating churning was performed, and it uniformed, and held to the thermostat. The weight ratio of heptane and desalted water was fixed to 1:1. The existence of each compounding ratio and the phase separation in each temperature was checked, and temperature (HLB temperature) when producing the microemulsion of one phase in the smallest amount of surfactant mixtures was checked. Minimum surfactant mixture concentration (concentration of polyglycerin laurate + sucrose fatty acid ester) required to form microemulsion was calculated from the liquid composition at that time. The weight ratio of the meltable-ed ghost (heptane + desalted water) to the surfactant mixture at that time was calculated. The result is shown in Table 1.

[0020][Embodiment 2] It carried out like Embodiment 1 except having used the commercial cane sugar stearic acid ester S-570 (made by Mitsubishi Chemical) instead of cane sugar stearic acid diester. The presentations of the cane sugar stearic acid ester S-570 are monoester / diester / triester / tetraester =30/37/24/9.

Constituent fatty acids are stearic acid/palmitic acid =70/30.

A result is shown in Table 1.

[0021][Comparative example 1] It carried out like Embodiment 1 except not making cane sugar fatty acid diester contain. The result is shown in Table 1.

[0022]

[Table 1]

表 1

	実施例 1	実施例 2	比較例 1
ショ糖脂肪酸エステル	ショ糖ステアリン酸エステル	S-570	—
界面活性剤混合物中のショ糖脂肪酸エステルの重量分率(%)	5.00	5.00	0.00
マイクロエマルションを形成するのに必要な最低界面活性剤混合物濃度(重量%)	2.88	2.77	5.08
被可溶化物の界面活性剤混合物に対する重量比	33.72	35.10	18.69
HLB温度(℃)	59.00	100.00	70.00

\*S-570 ; ショ糖ステアリン酸エステル/ショ糖パルミチン酸エステル  
=70/30  
モノエステル/ジエステル/トリエステル/テトラエステル  
=30/37/24/9

\*非イオン界面活性剤; ポリグリセリンラウリン酸エステル

\*水: 油性成分=脱塩水: ヘプタン(重量比1:1)

[0023]When cane sugar fatty acid diester is used as a surface activity assistant to polyglycerin laurate (nonionic surfactant) from the result (refer to Table 1) of Embodiment 1 and the comparative example 1, As compared with the case where cane sugar fatty acid monoester is used, the concentration of the minimum surfactant mixture required to form microemulsion falls, and it turns out that solubilization

capacity is increasing.

[0024]When the sucrose fatty acid ester which contains many cane sugar fatty acid diester to polyglycerin laurate (nonionic surfactant) is used as a surface activity assistant from the result (refer to Table 1) of the comparative example 1 also about Embodiment 2, As compared with the case where cane sugar fatty acid diester is not used, the concentration of the minimum surfactant mixture required to form microemulsion falls, and it turns out that solubilization capacity is increasing.

[0025]

[Effect of the Invention]Solubilization capacity can be made to increase efficiently, without changing HLB of a system a lot, if the surface activity assistant containing the cane sugar fatty acid diester of this invention is used when manufacturing microemulsion using polyglyceryl fatty acid ester.

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